CLAIMS

What is claimed is:

1. A method for the detection of an analyte in a sample, which comprises contacting the sample to be tested with a three-dimensional array of a polydiacetylene backbone having a substrate incorporated in the array, wherein the substrate has direct affinity for the analyte or can function as a binder to the analyte or can react with the analyte;

and detecting the change in fluorescence to indicate the presence of the analyte.

2. The method of claim 1 wherein the array is in the form of a solution of liposomes or tubules.

3. The method of claim 1 wherein the analyte is an enzyme and the substrate is a reactive substrate of that enzyme.

4. The method of claim 1 or 2 wherein the analyte is an antigen and the substrate is the antibody of that antigen.

5. The method of claim 1 or 2 wherein the analyte is an antigen and the substrate is a fragment of the antibody of that antigen.

6. The method of claim 1 or 2 wherein the analyte is an antibody or antibody fragment and the substrate is the antigen of that antibody.

7. The method of claim 1 or 2 wherein the analyte is an antibody or antibody fragment and the substrate is the epitope of that antibody.

8. The method of claim 2 wherein the analyte is an enzyme and the substrate is a reactive substrate of that enzyme.

9. The method of claim 1 wherein the polydiacetylene of the array is in the non-fluorescent form, exhibiting a fluorescent signal that is about 1-3 times that of the background and less than that of the corresponding fluorescent form.

10. The method of claim 1 wherein the substrate includes a ligand.

11. The method of claim 1 wherein the array is in the form of a solution of a liposome or tubule.

12. The method of claim 1 wherein the substrate includes a reactive substrate.

13. The method of claim 12 wherein the array is in the form of a solution of a liposome or tubule.

14. The method of any one of claims 1 to 13 wherein the three-dimensional array further comprises a fluorophore and wherein the change in fluorescence of the polydiacetylene array is monitored.

15. The method of any one of claims 1 to 13 wherein the three-dimensional array further comprises a fluorophore and wherein the change in fluorescence of the fluorophore is monitored.

16. The method of claim 1 wherein the array does not contain a further fluorophore.

17. The method of claim 1 wherein the change in fluorescence is detected by exposure to light having wavelengths below 550 nm and measurement of the emission.

18. The method of claim 1 wherein the change in fluorescence is detected by exposure to light having wavelengths between 450 and 500 nm and measurement of the emission.

19. The method of claim 1 wherein the polydiacetylene of the array exhibits fluorescence and the fluorescence increases as an indication of the presence of the analyte.

20. A method for the detection of an analyte in a sample which comprises contacting the sample to be tested with a two-dimensional array of a polydiacetylene backbone having a substrate incorporated in the array, wherein the substrate has direct affinity for the analyte or can function as a binder to the analyte or can react with the analyte and wherein the two-dimensional array comprises a polymerized diacetylene array wherein no more than 90% of the diacetylenes are terminated with groups that specifically bind to the analyte;
and detecting the change in fluorescence to indicate the presence of the analyte.

21. The method of claim 20 wherein the two-dimensional array comprises a polymerized diacetylene array wherein no more than 60% of the diacetylenes are terminated with groups that specifically bind to the analyte.

22. The method of claim 20 wherein the array is coated onto a solid support.

23. The method of claim 22 wherein the solid support is a porous membrane.

24. The method of claim 20 wherein the array is unsupported.

25. The method of claim 20 which further comprises providing a filter or flow cell containing the array supported on or in a porous membrane; and passing a solution of the analyte through the filter or flow cell before or during the detect.

26. The method of claim 20 wherein the substrate includes a ligand.

27. The method of claim 26 wherein the array is on a nano-porous membrane.

28. The method of claim 20 wherein the substrate includes a reactive substrate.

29. The method of claim 28 wherein the array is on a nano-porous membrane.

30. The method of claim 20 wherein the two-dimensional array further comprises a fluorophore and wherein the change in fluorescence of the polydiacetylene array is monitored.

31. The method of claim 20 wherein the two-dimensional array further comprises a fluorophore and wherein the change in fluorescence of the fluorophore is monitored.

32. The method of claim 26 or 28 wherein the three-dimensional array further comprises a fluorophore and wherein the change in fluorescence of the polydiacetylene array is monitored.

33. The method of claim 26 or 28 wherein the three-dimensional array further comprises a fluorophore and wherein the change in fluorescence of the fluorophore is monitored.

34. The method of claim 20 wherein the array does not contain a further fluorophore.

35. The method of claim 20 wherein the change in fluorescence is detected by exposure to light having wavelengths below 550 nm and measurement of the emission.

36. The method of claim 20 wherein the change in fluorescence is detected by exposure to light having wavelengths between 450 and 500 nm and measurement of the emission.

37. The method of claim 20 wherein the polydiacetylene of the array exhibits fluorescence and the fluorescence increases as an indication of the presence of the analyte.

38. A method for the detection of an analyte in a sample which comprises contacting the sample to be tested with three-dimensional arrays of a polydiacetylene backbone having a substrate incorporated in the arrays, wherein the substrate has direct affinity for the analyte or can function as a binder to the analyte or can react with the analyte, and the arrays are suspended in solution; and detecting the change in polarization

of the fluorescence of the polydiacetylene arrays upon being excited with polarized light, to indicate the presence of the analyte.

39. The method of claim 38 wherein the three-dimensional arrays are liposomes.

40. The method of claim 38 or claim 39, wherein the substrate is an antibody and the analyte an antigen to that antibody.

41. The method of claim 38 or claim 39, wherein the substrate is an antibody fragment and the analyte an antigen to that antibody fragment.

42. The method of claim 38 or claim 39, wherein the analyte is immobilized onto a surface.

43. The method of claim 38 or claim 39 wherein the analyte is attached to a microbead.

44. The method of claim 38 or claim 39 wherein the analyte is attached to a macrobead.

45. The method of claim 38 wherein the three-dimensional arrays also contain fluorophores and the change in the polarization of the fluorophore emission upon the polydiacetylene array being excited with polarized light is detected to indicate the presence of the analyte.

46. The method of claim 45 wherein the three-dimensional arrays are liposomes.